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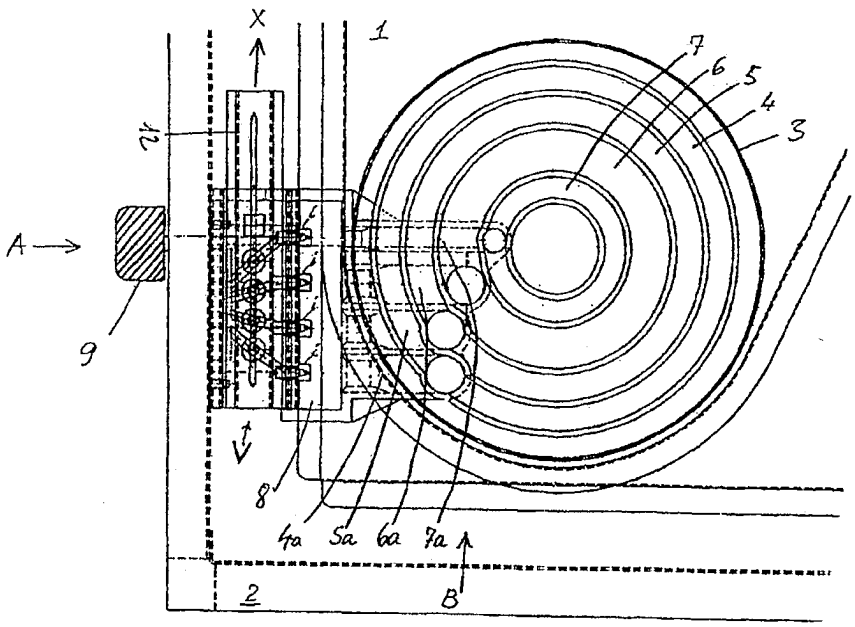
(54) Title: AN ACTUATOR FOR A MULTIVALVE GAS BURNER



(57) Abstract

A gas burner with concentric ring burners is supplied with gas/air mixture via individual conduits. Each conduit is supplied with gas from a manifold having a low volume via individual valves. These are controlled by a horizontal sliding linear cam acting on cam followers on each valve. Standard components are used to a large extent. The advantages are high reliability and ease of use.

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An actuator for a multivalve gas burner.

The invention relates to an actuator for a multivalve block for gas burners.

Traditionally, the various open gas burners on a gas hob were supplied via a valve which controlled the volume of gas entering each burner per time unit. In more recent burners, a concentric disposition of circular gas ring burners are individually supplied with gas/air mixture under the control of valves. The consumer desires simple, logical adjustments in order to control the production of heat and would not tolerate complex manipulations of several valves in order to light the said ring burners in sequence. One solution to this has been shown in GB 22 30 595 in which a linear disposition of orifices in a gas supply chamber has a number of gas lines leading to each ring burner, a nozzle or injector being fitted in each gas line. The orifices are opened in sequence by a cylinder fitted with a series of cams acting on springs disposed in the chamber, which cylinder is rotated from a position where no cam is engaging a spring for an orifice (hob off) through various positions with increasing numbers of cams engaging springs. The cylinder is fitted in parallel to the front edge of the hob, and the rotary motion is transferred from the front of the hob via conical cogwheels. All the valves are orifices in a common chamber whithin which the cylinder is disposed. This functions well, however a volume of gas which is large in relation to the volume in the gas pipe supplying it is constantly present in the chamber, and the shaft of the cylindrical actuator has to pass through a high-precision gasket in the wall of the chamber. Furthermore, the traditional control device for a gas valve, a rotating knob, does not give a very precise indication of the heat to be generated.

It is a purpose of the invention to provide an intuitively more precise indication of the heat production of a gas burner and at the same time to

enable the use of standard valve components and reducing the volume taken up by the valve mechanism. This is obtained in an actuator according to the invention which is particular in that the valves are fitted in a manifold and are actuated in sequence by a sliding cam which is directly fitted to a slider with a knoblike handle, each valve having only an operating rod projecting outside the manifold. The volume occupied by the valves is much smaller than in the prior art, and the slider or lever handle gives a very clear indication of the adjustment made. Furthermore, the valves have an axial travel which enables the use of simpler gasket design or even a bellows design.

In an embodiment of the invention the valve travel defining the difference in level in the sliding cam is identical for all valves. This means that the resistance felt to the movement of the knob will be the same for each new valve engaged, but equally that variation of each valve opening will only occur in a very short stretch of the path of the knob. The valves will essentially have an on-off function. This is a particular advantage when the user shall only have a limited choice of positions.

In a further embodiment of the invention the differences in level is built up gradually from one end of the cam to the other. This solution will be used when the power output of the gas burner is not only controlled by the number of active ring burners but also by the power output of each ring burner. This creates a heat distribution which may dependent on circumstances may be more suitable.

A particularly useful user interaction with the burner is obtained when the operating knob is placed alongside an edge of the hotplate into which the burner is fitted. This enables a clear graphical indication of the output of the burner in question.

The invention will be described in greater detail

with reference to the drawing, in which

Fig. 1 shows a top view of a corner of a cooktop with a burner and an actuator according to the invention,

Fig. 2 shows a vertical section of the same burner and actuator, along the direction A,

Fig. 3 shows a side view in the direction B, and

Fig. 4 shows an enlargement of the valve manifold shown in Fig. 3.

In Fig. 1 is shown the left corner of a cooktop 1 nearest to a consumer. The practical construction would have a glass or glass ceramic plate covering the whole cooktop and extending to the edge of the frame 2. The burner 3 is composed of individually supplied rings 4, 5, 6, and 7. Each ring is supplied with air/gas mixture by means of conduits 4a, 5a, 6a, 7a connected to a joint source for primary air 8, in to which nozzles or injectors i for gas are individually directed. The supply of gas to the injectors i occurs via valves V which are actuated by means of a slider having a control knob 9.

Fig. 2 shows a section through the valve and gas conduit arrangement. As described above, the whole arrangement is covered by a top plate T. The control knob 9 is connected to a slider 10 which moves in a direction perpendicular to the plane of the drawing. A cam follower 11 with a rounded lower surface is in touch with a cam part 12 on the slider in order that a valve V may be imparted a vertical movement against the return force of a spring 13. When the valve V is opened, gas is admitted to the injector or nozzle i which draws air from the source of primary air 8 into the venturi 14 so that a combustible air/gas mixture may be fed via the conduit 4a to the burner ring 4. The mixture will be ignited by means of a spark plug 15 or a similar device, and a proper burning condition is monitored by means of a device 16 which in turn may turn off the supply of gas

in case it does not burn.

Fig. 3 shows the series of valves V actuated by the cam 12 which consists of two levels joined by a sloping surface. The cam followers 11 are formed with a suitable radius of curvature, being essentially cylindrical.

The arrangement is shown in greater detail in Fig. 4, where it will be seen that the two levels of the cam 12 is obtained by sliding it sideways, thereby lifting the valves V against the return force of the springs 13. The arrangement of the linear cam ensures that the valves are operated in sequence such that movement of the cam to the right in the drawing will open more and more valves. The valves operate in a very small volume G which is connected to the gas supply, and each valve stem is made gas tight by means of an o-ring member O surrounding the operating rod (17).

The valve is supplied with a safety system which blocks the flow of gas when the thermocouple 16 is not heated by the flame of the burner. In order to light the burner, the cam 12 must move in the direction indicated "x" in order that the slope 18 acts on the rod 19 and opens the disc valve 20, moving the yoke in contact with the electromagnet 21 whereby gas may pass. During the movement the cam 12 actuates the microswitch 22 which acts to operate the igniter (not shown in the drawing) which supplies a high voltage to the electrode 15 which lights the burner and simultaneously supplies a voltage of 50 mV (23) in order to maintain a holding current in the electromagnet 21 for a time sufficient to obtain ignition of the burner and to heat the thermocouple 16 which continues to supply the holding current for the electromagnet 21. In case a flame is not detected at the burner, the thermocouple 15 is cooled and no longer supplies a holding current to the electromagnet 21 which closes the gas valve when it is no longer energised.

PATENT CLAIMS

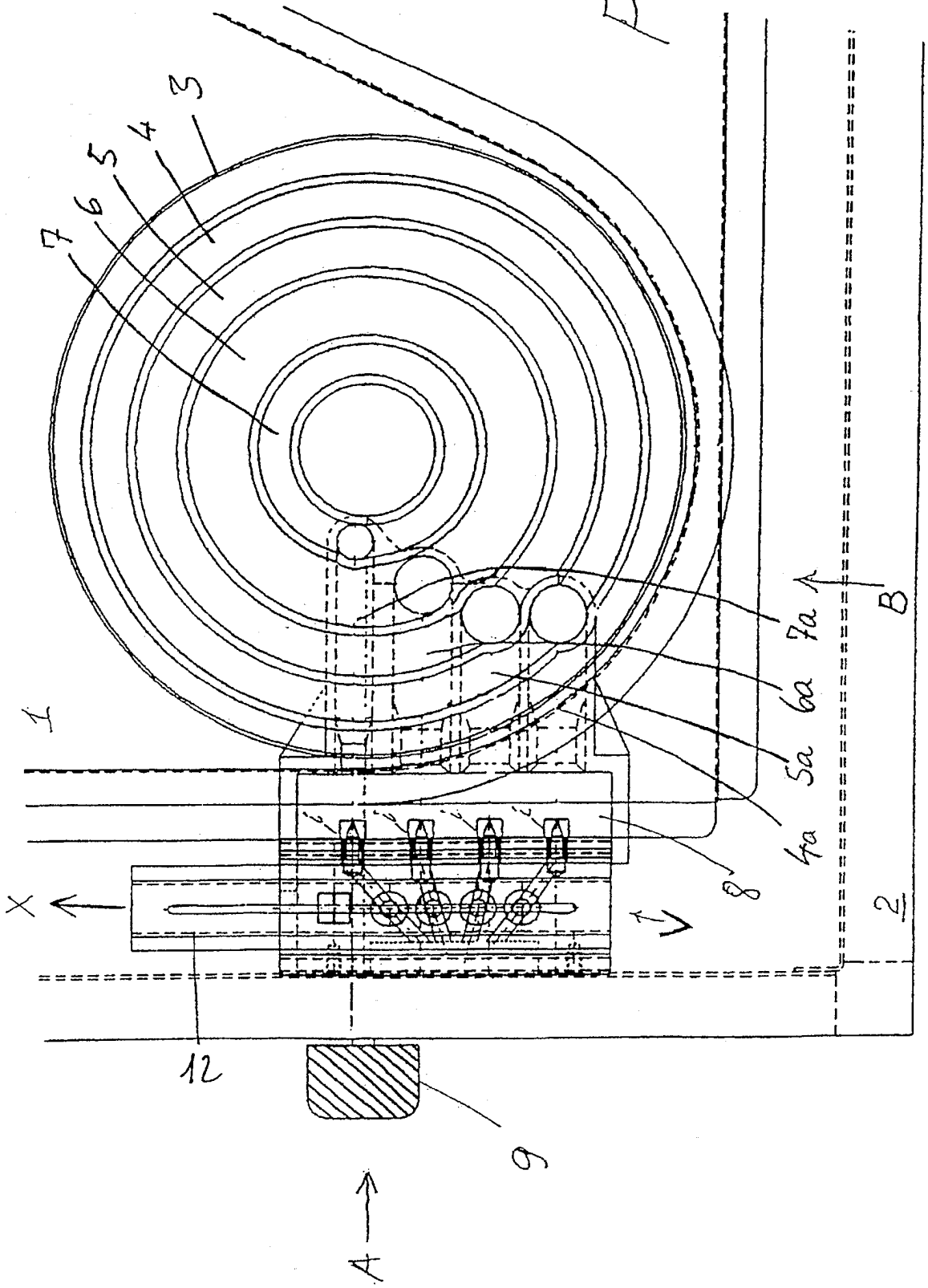
1. An actuator for a multi-valve block for a gas burner, characterized in that the valves (V) are fitted in a manifold (G) and are actuated in sequence by a sliding cam (12) which is directly fitted to a slider (10) with a knoblike handle, each valve having only an operating rod (17) projecting outside the manifold.

2. An actuator according to claim 1, characterized in that the valve travel defining the difference in level in the sliding cam is identical for all valves.

3. An actuator according to claim 1, characterized in that the differences in level is built up gradually from one end of the cam to the other.

4. An actuator according to claim 1, characterized in that the operating knob (9) is placed alongside an edge (2) of the hotplate into which the burner (3) is fitted.

Fig. 1.



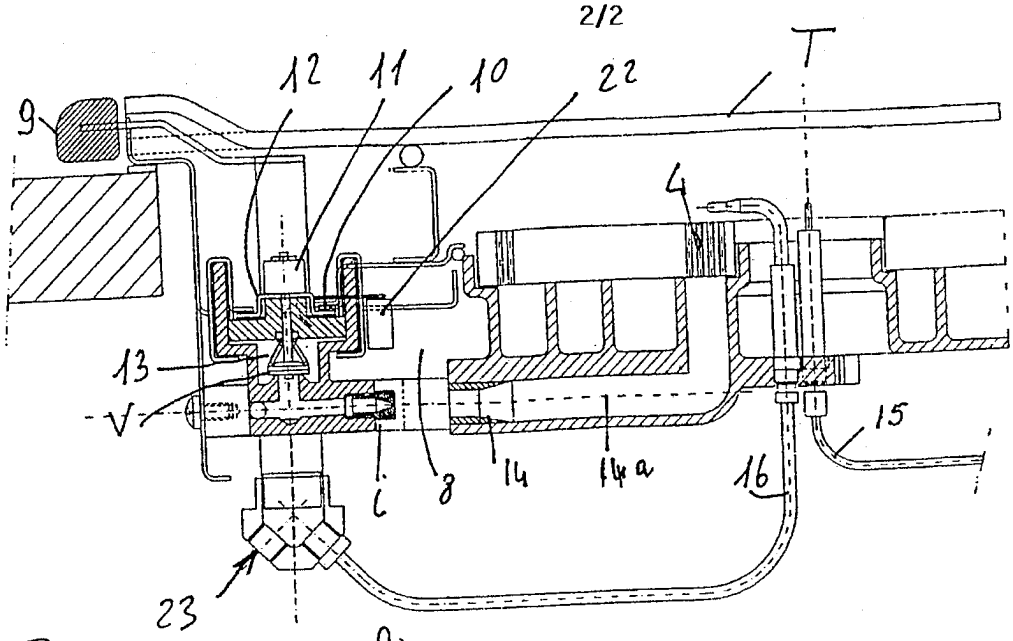


Fig 2

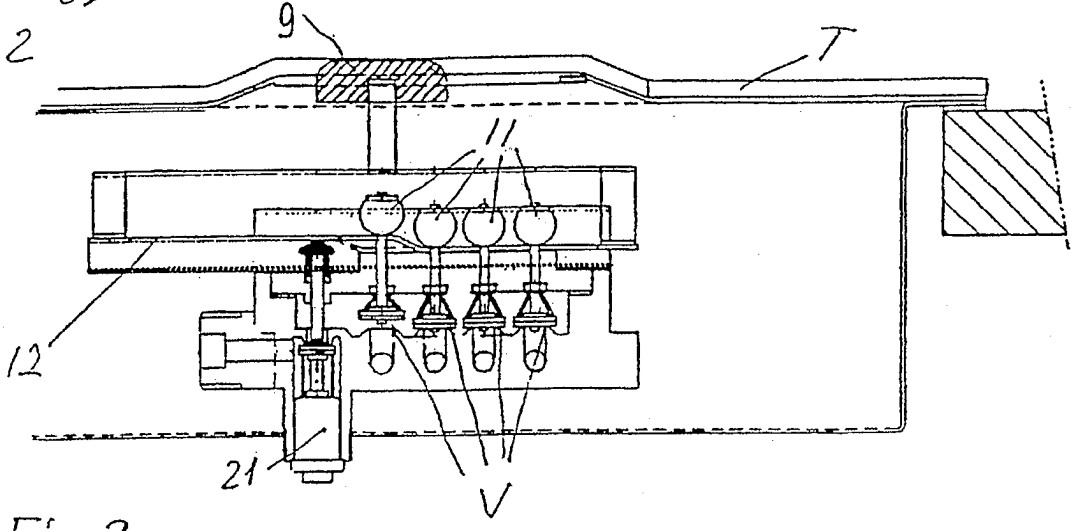


Fig. 3.

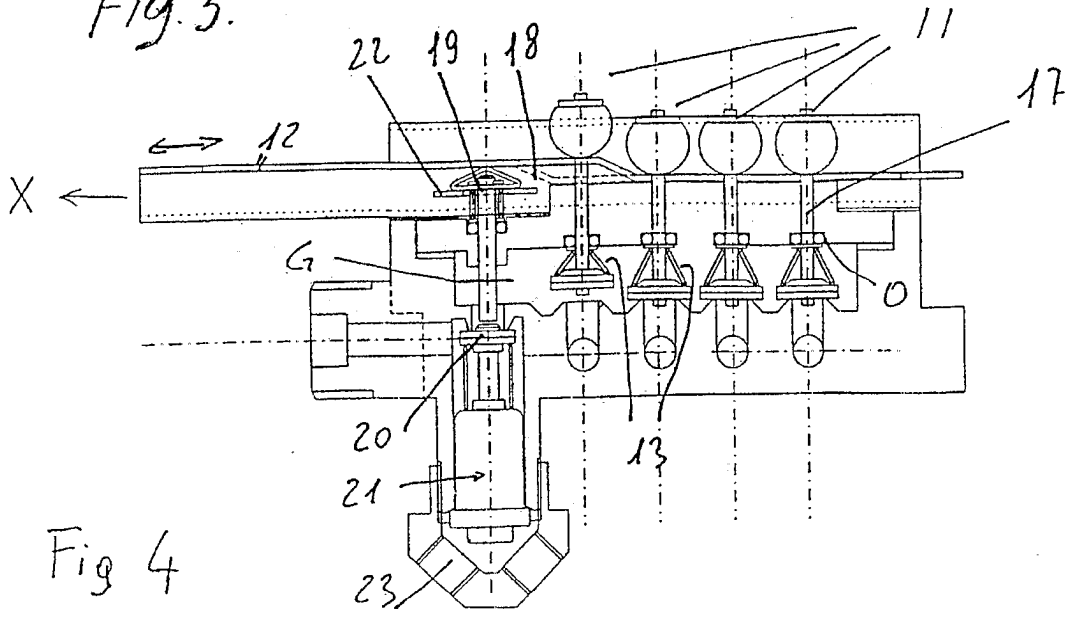


Fig 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 97/00352

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F16K 31/524
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 1595039 A1 (CAVALLI GIAMPAOLO), 17 July 1970 (17.07.70), figures 1,3, claim 1 --	1
A	GB 2230595 A (POMPE DEVELOPMENTS LIMITED), 24 October 1990 (24.10.90), figure 1, abstract --	1
A	US 4785680 A (JONES), 22 November 1988 (22.11.88), figure 5, abstract --	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Information on patent family members

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